UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
BIN C15700
Seattle, WA 98115-0070

NMFS Tracking No.
2003/00123

September 12, 2003

Darrel L. Kenops
Acting Forest Supervisor
215 Melody Lane
Wenatchee, Washington 98801

Re: Endangered Species Act section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Skyline Ditch Special Use Permit Amendment, Okanogan County, Washington, WRIA 48

Dear Mr. Kenops:

In accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended, 16 USC 1536, and the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, 16 USC 1855, the attached document transmits NOAA's National Marine Fisheries Service (NOAA Fisheries) Biological Opinion (Opinion) and MSA consultation on the proposed amendment to the Skyline Ditch Company's special use permit for the operation of their water diversion across national forest lands in Okanogan County, Washington.

The United States Department of Agriculture, Forest Service has determined that the proposed action was likely to adversely affect Upper Columbia River spring-run (UCRS) chinook (*Oncorhynchus tshawytscha*) and Upper Columbia River (UCR) steelhead (*O. mykiss*) Evolutionarily Significant Units. Formal consultation was initiated on January 20, 2003.

This Opinion reflects formal consultation and an analysis of effects covering the above listed species in the Chewuch River, Okanogan County, Washington. The Opinion is based on information provided in the biological assessment received by NOAA Fisheries on January 17, 2003, subsequent information transmitted in technical meetings, telephone conversations, and electronic mail. A complete administrative record of this consultation is on file at the Washington State Habitat Branch Office.

NOAA Fisheries concludes that amending the special use permit is not likely to jeopardize the continued existence of the above listed species. Please note that the incidental take statement, which includes reasonable and prudent measures and terms and conditions, was designed to minimize take.

The MSA consultation concluded that the proposed action may adversely impact designated Essential Fish habitat (EFH) for chinook and coho (*O. kisutch*) salmon. Specific Reasonable and Prudent Measures of the ESA consultation, and Terms and Conditions identified therein, would address the negative effects resulting from the proposed COE actions. Therefore, NOAA Fisheries recommends that they be adopted as EFH conservation measures.

If you have any questions, please contact Dennis Carlson of the Washington State Habitat Branch Office at (360) 753-5828 or email at dennis.j.carlson@noaa.gov.

Sincerely,

F.r Michael R Crouse

D. Robert Lohn
Regional Administrator

Enclosure

Endangered Species Act - Section 7 Consultation
Biological Opinion
And
Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Skyline Ditch Operations Special Use Permit
Okanogan County, Washington
NMFS Tracking No.: 2003/00123

Agency:	USDA Forest Service Okanogan National Forest
Consultation Conducted by:	National Marine Fisheries Service, Northwest Region

Approved by: F.r Michael R Course Date: September 12, 2003

D. Robert Lohn
Regional Administrator

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1.0 INTRODUCTION

This document is the product of an Endangered Species Act (ESA) section 7 formal consultation and Magnuson-Stevens Fishery Conservation and Management Act (MSA) Essential Fish Habitat (EFH) consultation between the NOAA's National Marine Fisheries Service (NOAA Fisheries) and the United States Department of Agriculture Forest Service (FS), Okanogan National Forest, Methow Valley Ranger District, for a proposed amendment to a special use permit to the Skyline Ditch Company to convey water in their irrigation line across FS managed land in the Okanogan National Forest near Winthrop, Okanogan County, Washington. The proposed action will occur within two Evolutionarily Significant Units (ESU[1]) affecting endangered Upper Columbia River spring-run (UCRS) chinook (*Oncorhynchus tshawytscha*) and endangered Upper Columbia River (UCR) steelhead (*O. mykiss*). Additionally, the action area is designated as EFH for chinook (*O. tshawytscha*) and coho (*O. kisutch*) salmon.

The purpose of this document is to present NOAA Fisheries Biological Opinion (Opinion) on whether the proposed action is likely to jeopardize the continued existence of the UCR steelhead and/or UCRS chinook ESUs listed under the ESA. Further, this document will determine if the proposed action will adversely affect designated coho and chinook salmon EFH. These ESA and EFH determinations will be reached by analyzing the biological effects of operating the water conveyance line, relating those effects to the biological and ecological needs of listed species, and then adding these effects to the environmental baseline of the action area.

1.1 Background and Consultation History

The FS submitted a biological assessment (BA) and request for ESA section 7 formal consultation and EFH consultation in June 2002. On September 6, 2002, the FS withdrew the request for consultation. The BA was subsequently revised by the FS to include additional field information collected during the summer and fall seasons of 2002. On January 17, 2003, the FS submitted a revised BA and formal ESA and EFH consultation was initiated on January 20, 2003. Additional revised ditch operation information was forwarded to NOAA Fisheries on May 16, May 27, May 31, and June 18, 2003. This combined ESA and EFH consultation is based on the information presented in the revised BA and amendments, EFH assessment, electronic mail (e-mail) correspondence, telephone conversations, and interagency technical meetings.

The FS is proposing to amend a special use permit to the Skyline Ditch Company (Skyline) for up to ten years to convey water for agriculture and domestic uses. Skyline is authorized to use

[1]"ESU" means a population or group of populations that is considered distinct (and hence a "species") for purposes of conservation under the ESA. To qualify as an ESU, a population must (1) be reproductively isolated from other conspecific populations, and (2) represent an important component in the evolutionary legacy of the biological species. (Waples 1991).

the National Forest lands for water conveyance in accordance with the terms and conditions stipulated in the special use permit and operation and maintenance plan.

The proposed changes to irrigation (water conveyance) operations evaluated in the revised BA and its subsequent revisions will be implemented through an amendment to the Skyline special use permit operation and maintenance plan that was conditioned by NOAA Fisheries Opinion (WSB-98-061), issued to the FS on September 6, 2000. The 2000 NOAA Fisheries Opinion concluded that the action was likely to jeopardize the existence of listed steelhead and spring chinook salmon. That Opinion contained a reasonable and prudent alternative (RPA) to maintain instream flow levels ("ESA flow levels") that are necessary to provide properly functioning fish habitat, and directed the FS to condition the Skyline special use permit to require that ditch operations be modified or curtailed to maintain instream flows protective of ESA listed fish, and/or require diversions to cease if those instream flows could not be maintained.

Another element of the RPA was conditioning the special use permit to require the permittee to design, construct, and maintain a fish screen that is adequate to prevent impingement or injury to fish across the full range of potential diversion flows. The fish screen design, construction, and maintenance should be consistent with screen criteria developed by the NOAA Fisheries in 1995. A new fish screen that meets those criteria has been constructed.

The FS also implemented reasonable and prudent measures through non-discretionary terms and conditions on their special use permit that included: (1) headgate and fish screen inspection to ensure proper operation prior to commencing operations each irrigation season; (2) maintain in-stream and ESA flows; and, (3) install and maintain flow monitoring devices in the ditch up and downstream from Skyline's point of diversion. These requirements have been met.

The proposed amendment will revise the FS special use permit to require operational actions the Skyline will implement at specific instream flow levels. The proposed amendment is based on additional historic flow information, hydraulic flow modeling and new instream flow data collected by Golder Associates, and research, field observations, and measurements conducted by the FS.

1.2 Description of the Proposed Action

The Skyline headgate is located in a man-made side channel along the right side (west bank) of the Chewuch River on National Forest land at about river mile (RM) 8.7, just downstream of the confluence with Boulder Creek. The Skyline Ditch occupies a strip of FS managed lands that is approximately 2,190 feet long and 15 feet wide. The ditch is approximately 6.2 miles long, and has been entirely enclosed in a pipeline to prevent leakage (Molesworth, pers. comm. 2003). Historically, the Skyline Ditch carried a flow in excess of 25 cubic feet per second (cfs). It now carries up to a maximum of 17.8 cfs.

The objective of the proposed FS special use permit amendment is to maintain adequate instream flows in the lower 8.7 miles of the Chewuch River for listed salmonids while allowing Skyline to

deliver water throughout the irrigation season (April 1 through October 15 of any year). The historical ditch turn-off date, established under a Washington State water right claim for the Skyline, is November 1, every year.

The proposed action includes a suite of conditions, as discussed in the following sections, that will govern the quantity of water diverted by Skyline. The amount will vary depending on flows in the Chewuch River. It is important to understand the local geography in order to understand how these conditions will be applied.

There are two significant water diversions on the Chewuch River downstream of the Skyline diversion. The Chewuch Canal, at RM 8, removes 31 cfs, and the Fulton Canal, at RM 0.7, removes 20 cfs. The conditions included in the proposed action will be initiated according to flows at the United States Geological Survey (USGS) Chewuch River Gauge (USGS Gauge), at RM 0.2. The Skyline, Chewuch, and Fulton diversions are gauged as well.

The FS is proposing to limit diversions by Skyline whenever flows in the Chewuch River are below 200 cfs at the USGS Gauge. Furthermore, the proposed action would require that the full amount of Skyline diversions are replaced by reductions at other diversions at or above RM 8 whenever Chewuch River flows are 80 cfs or less at the USGS gauge. Part of this water will be replaced by actions the FS has undertaken at its diversion on Eightmile Creek, a Chewuch tributary just upstream of the Skyline diversion.

The FS had been diverting 4.5 cfs, but has converted its surface diversion to a well that will draw not more than 1 cfs. For the purposes of this analysis, it is assumed that the improvements at Eightmile Creek will contribute up to 2 cfs to Chewuch River flows. This 2 cfs may be counted as a credit against Skyline diversions when flows are at or below 80 cfs at the USGS gauge. The proposed action would allow Skyline to divert up to 4.5 cfs when flows are 80 cfs or less. Accordingly, only if other water users at or above RM 8 reduce their diversions by a combined 2.5 cfs if Skyline could divert 4.5 cfs.

It is assumed that the Fulton Canal will be removing 20 cfs throughout the irrigation season. However, if diversions at the Fulton Canal are reduced, the flow levels triggering changes in Skyline diversions will be correspondingly increased. The specific conditions the FS intends to place on the Skyline special use permit are as follows.

Ditch Start-up

Irrigation season in the Methow Basin generally begins between mid April and the first week of May and extends into October. The start of the irrigation season usually coincides with spring snow melt, when instream flow conditions rapidly increase from low winter base flows. Skyline's water claim allows them to begin diverting on April 1 of any given year. In some years, this is earlier than snow melt and Chewuch River flows may be below 100 cfs.

Skyline will not be allowed to divert water until Chewuch River flows are at or above 100 cfs at the USGS gauge. Skyline Ditch startup will not cause Chewuch River flows to decrease below 100 cfs. When Chewuch River flows are between 100 and 200 cfs, Skyline will divert not more than 9 cfs. Should instream flow decrease below 100 cfs for any reason at start-up, Skyline will cease diversion. Once flows exceed 200 cfs, Skyline may increase its diversion to a maximum of 17.8 cfs. Skyline operation in excess of 9 cfs will not cause spring season instream flow in the Chewuch River to drop below 200 cfs at the USGS gauge. Should instream flows recede below 200 cfs during this time, Skyline will reduce their diversion to not more than 9 cfs. Skyline may divert a maximum of 17.8 cfs for agriculture and domestic uses, and fill existing and planned storage reservoirs off National Forest land whenever flows are at least 200 cfs at USGS gauge.

In most years, once spring snow melt begins, instream flows rise quickly. Returning UCR steelhead will migrate to their natal tributaries to spawn during this time (March-July). The proposed ditch start-up and ramping of diversion flows is intended to coincide with the rapidly ascending hydrograph, when any effect of the diversion on water quantity would likely be masked or minimized by the rapidly increasing instream flow derived primarily from snow melt. Golder Associates (2002) graphically demonstrated this by comparing the median observed (with diversions) and naturalized (without diversions) hydrographs for the Chewuch River for a ten-year period of record (1992-2001). The FS believes the proposed ditch start-up strategy would be protective of spring season instream flows necessary for salmonid migration, juvenile rearing, and steelhead spawning.

Peak Flow Descending

The FS proposes to condition the Skyline special use permit during the peak flow recession period to diversion shut off as follows. As a measure to minimize impacts to instream flow, Skyline will voluntarily reduce their water diversion from a maximum of 17.8 cfs down to 9 cfs when summer season flows in the Chewuch drop to 200 cfs. Skyline will continue to operate at a maximum diversion rate of 9 cfs when instream flow in the Chewuch ranges between 200 cfs and 80 cfs, as measured at the USGS gauge. When flows at the USGS gauge in the Chewuch drop below 80 cfs, and Fulton diversions are 20 cfs, Skyline Ditch may divert up to a maximum of 4.5 cfs, but only if the full amount of their diversion is replaced by reductions at other diversions at or above RM 8. As mentioned previously, 2 cfs of this will be replaced by the changes the FS has made at Eightmile Creek. The other 2.5 cfs may be replaced by reducing diversions at the Chewuch Canal, or other diversions above that point. The FS will be responsible for ensuring and documenting that Skyline's diversion has been fully replaced.

Based on this information, the FS believes conditioning the Skyline special use permit in this manner will minimize the effects of Skyline's water diversion on salmonid migration, rearing, and spawning, while allowing Skyline to meaningfully enjoy its water right. The effects of streamflow diversion were analyzed in Golder Associates (2002). They compared the median observed (with diversions) and naturalized (no diversions) hydrographs for the Chewuch River for the 1992-2001 period of record. According to the median observed and naturalized hydrograph data, the effects of diversions on instream flow during peak flow recession becomes

measurable at approximately 200 cfs (Golder Associates 2002). This was calculated to occur during the first or second week of August during most water years.

The proposed action will minimize the effects of Skyline's diversion at river flows between 80 and 200 cfs, and will essentially obviate their effects when flows are at or below 80 cfs.

Additional Minimization of Adverse Effects

The FS also proposes to permanently provide flow in an approximately one-half mile long fish bypass channel at Skyline's diversion headworks and fish screen facility. Although a manmade feature, the channel supports a fairly robust riparian zone of shrubs and small trees. Maintaining these flows will provide year round off-channel rearing habitat for salmonids in a reach of the Chewuch River where off-channel rearing habitat is scarce.

1.3 Description of the Action Area

Under the ESA, the "action area" is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for this consultation is the Chewuch River, beginning at the Skyline diversion at RM 8.7, proceeding downstream to the confluence with the Methow River and extending some distance down the Methow River from its confluence with the Chewuch. The precise downstream limit of the action area cannot be easily determined because of the extent of indirect effects of the proposed action on Methow River flows varies according to the flow stage. Note that the Chewuch River has been gauged at RM 0.2 since November 1991 (USGS 1994).

2.0 ENDANGERED SPECIES ACT

2.1 Biological Opinion

The objective of this Opinion is to determine whether the proposed project is likely to jeopardize the continued existence of the UCR steelhead and/or UCRS chinook ESUs.

2.1.1 Status of Species

The listing status and biological information for NOAA Fisheries listed species that are the subject of this consultation are described below in Table 1.

Species	Listing Status	Critical Habitat	Protective Regulations	Biological Information
Upper Columbia River spring-run chinook salmon	March 24, 1999; 64 FR 14308, Endangered	Not Designated[2]	July 10, 2000; 65 FR 42422	Myers *et al.* 1998; Healy 1991
Upper Columbia River steelhead	Aug. 18, 1997, 62 FR 43937, Endangered	Not Designated	July 10, 2000, 65 FR 42422	Busby *et al.* 1996

Table 1. References for Additional Background on Listing Status, Biological Information, and Critical Habitat Elements for the Listed Species Addressed in this Opinion.

Throughout the Columbia Basin, salmonids have been negatively affected by a combination of habitat alteration and hatchery management practices. Mainstem dams on the Columbia River are perhaps the most significant source of habitat degradation for the ESUs addressed under this consultation. The dams act as partial barriers to passage, kill out-migrating smolts in their turbines, raise temperatures throughout the river system, and have created lentic refugia for salmonid predators. In addition to dams, irrigation systems have had a major negative impact by diverting large quantities of water, stranding fish, acting as barriers to passage, and returning effluents containing chemicals and fine sediments. Other major habitat degradation has occurred through urbanization and livestock grazing practices (WDFW *et al.* 1993; Busby *et al*. 1996; NMFS 1996a; 1998a and 1998b; 2000; 64 FR 14308, April 22, 1992; 62 FR 43937, August 18, 1997).

Habitat alterations and differential habitat availability (*e.g.*, fluctuating discharge levels) impose an upper limit on the production of naturally spawning populations of steelhead and salmon. The National Research Council committee on Protection and Management of Pacific Northwest Anadromous Salmonids identified habitat problems as a primary cause of declines in wild salmon runs (NRCC 1996). Some of the habitat impacts identified were the fragmentation and loss of available spawning and rearing habitat, migration delays, degradation of water quality, removal of riparian vegetation, decline of habitat complexity, alteration of stream flows and streambank and channel morphology, alteration of ambient stream water temperatures, sedimentation, and loss of spawning gravel, pool habitat, and large woody debris (LWD) (NMFS 1996a; 1998a and 1998b; NRCC 1996; Bishop and Morgan 1996).

Hatchery management practices are suspected to be a major factor in the decline of these ESUs. The genetic contribution of non-indigenous, hatchery stocks may have reduced the fitness of the locally adapted native fish through hybridization and associated reductions in genetic variation

[2]Under development. On April 30, 2002, the U.S. District Court for the District of Columbia approved a NOAA Fisheries consent decree withdrawing a February 2000 Critical Habitat designation for this and 18 other ESUs.

or introduction of deleterious (non-adapted) genes. Hatchery fish can also directly displace natural spawning populations, compete for food resources, or engage in agonistic interactions (Campton and Johnston 1985; Waples *et al*. 1991; Hilborn 1992; NMFS 1996a; March 10, 1998, 63 FR 11798).

The following information summarizes the status of Columbia River salmonids by ESU that are the subject of this consultation. Most of this narrative was largely taken from the Opinion on Reinitiation of Consultation on Operation of the Federal Columbia River Power System (FCRPS), including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin (NMFS 2000).

2.1.1.1 Upper Columbia River Steelhead

The UCR steelhead ESU, listed as endangered on August 18, 1997, (62 FR 43937), includes all natural-origin populations of steelhead in the Columbia River basin upstream from the Yakima River in Washington, to the U.S./Canada border. The Wells Hatchery stock is included among the listed populations. Critical habitat is not presently designated for UCR steelhead, although a designation is forthcoming (see footnote 2).

Estimates of historical (pre-1960s) abundance specific to this ESU are available from fish counts at dams. Counts at Rock Island Dam from 1933 to 1959 averaged 2,600 to 3,700, suggesting a pre-fishery run size exceeding 5,000 adults for tributaries above Rock Island Dam (Chapman *et al.* 1994). Runs may, however, already have been depressed by lower Columbia River fisheries. All freshwater life stages of UCR steelhead are found within the action area.

2.1.1.2 Upper Columbia River Spring Chinook

The UCRS chinook salmon ESU, listed as endangered on March 24, 1999, (64 FR 14308), includes all natural-origin, stream-type chinook salmon from river reaches above Rock Island Dam and downstream of Chief Joseph Dam, including the Wenatchee, Entiat, and Methow River basins. All chinook in the Okanogan River are apparently ocean-type and are considered part of the UCR summer- and fall-run ESU. The spring-run components of the following hatchery stocks are also listed: Chiwawa, Methow, Twisp, Chewuch, and White rivers and Nason Creek. Critical habitat is not currently designated for UCRS chinook, although a designation is forthcoming (see footnote 2).

The populations are genetically and ecologically separate from the summer- and fall-run populations in the lower parts of many of the same river systems (Myers *et al*. 1998). Although fish in this ESU are genetically similar to spring chinook in adjacent ESUs (*i.e.*, mid-Columbia and Snake), they are distinguished by ecological differences in spawning and rearing habitat preferences. For example, spring-run chinook in upper Columbia tributaries spawn at lower elevations (500 to 1,000 meters) than in the Snake and John Day River systems.

The upper Columbia River populations were intermixed during the Grand Coulee Fish Maintenance Project (1939 through 1943), resulting in a loss of genetic diversity between populations in the ESU. Homogenization remains an important feature of the ESU. Fish abundance has trended downward both recently and over the long term. At least six former populations from this ESU are now extinct, and nearly all extant populations have experienced escapements of fewer than 100 wild spawners in recent years. All freshwater life stages of UCRS chinook are found within the action area.

2.1.2 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR part 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species. This analysis involves the initial steps of (1) defining the biological requirements of the listed species and (2) evaluating the relevance of the environmental baseline to the species' current status.

From that, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries considers estimated levels of mortality attributed to: (1) collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

2.1.2.1 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species taking into account population size, trends, distribution, and genetic diversity. To assess the current status of the listed species, NOAA Fisheries starts with the determinations made in its original decision to list the species for protection under the ESA. In addition, the assessment will consider any new information or data that are relevant to the determination.

The relevant biological requirements are those necessary for the listed species to survive and recover to naturally reproducing population levels at which time protection under the ESA would be unnecessary. Species or ESUs not requiring ESA protection have the following attributes: population sizes large enough to maintain genetic diversity and heterogeneity, the ability to adapt to and survive environmental variation, and are self-sustaining in the natural environment.

UCR steelhead and UCRS chinook share similar basic biological requirements. These requirements include food, flowing water (quantity), high quality water (cool, free of pollutants, high dissolved oxygen concentrations, low sediment content), clean spawning substrate, and unimpeded migratory access to and from spawning and rearing areas (adapted from Spence *et al*.

1996). The specific biological requirements affected by the proposed action include streamflow, habitat quantity and quality, and unimpeded migratory access.

2.1.2.2 Environmental Baseline

The environmental baseline represents the current basal set of conditions to which the effects of the proposed action would be added. The term "environmental baseline" means "the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process" (50 CFR 402.02).

The Chewuch River watershed is a fifth field tributary to the Methow River. The FS manages approximately 320,000 acres of the watershed. Of this, about 108,000 acres are in the Pasayten Wilderness located near the Canada border. Other lands in the watershed include about 5,000 acres managed by Washington Department of Fish and Wildlife (WDFW) and another 15,000 acres of privately managed lands, located mainly within the lower reaches of the watershed (FS 1998).

The watershed's lowlands contain a mixture of agricultural land, meadows, and ponderosa pine and Douglas-fir forests. Land uses within the watershed include timber harvest, grazing, agriculture, and recreation. Federal land uses within the watershed accord with the PACFISH strategy or the Northwest Forest Plan. National Forest System lands located west of the Chewuch River at Lake Creek are managed under PACFISH. The proposed special use permit site is located in lands managed under the Northwest Forest Plan (FS 1998).

Access to a substantial portion of historical habitat for both spring chinook salmon and steelhead is blocked at Chief Joseph Dam on the mainstem Columbia River. For both the UCRS chinook salmon and UCR steelhead ESUs, there are also local habitat problems related to irrigation diversions, degraded riparian and instream habitat from urbanization, land conversion to crops and orchards, livestock grazing, and timber harvest (NMFS 1996a, 1996b, 1997, 1998a, 1998b).

The relationship between groundwater and surface flow in the Methow Basin is complex. Surface flow in the Methow River can intermittently disappear and reappear in different reaches as it flows downstream. Groundwater can reverse its direction of flow as the water level drops in the Methow River and it is uncertain into which aquifers and streams water goes when the irrigation diversions cease (Caldwell and Catterson 1992). Because of the hydrologic continuity of surface and groundwater in the basin, some believe that a large portion of the water diverted for agricultural or other domestic purposes returns near the point of diversion later in the year, improving conditions for riparian vegetation and fish. As a result, returning water is available for other uses (*i.e.*, riparian vegetation watering, fish use, etc.) within the basin (Mullan *et al.* 1992). NOAA Fisheries is unaware of any empirical support for this notion and generally believes that diverting flow from streams and rivers contributes to degraded environmental

baseline conditions for listed anadromous fish within stream segments that could be used by fish if conditions were suitable.

The Methow Basin, including the Chewuch watershed, is dominated by glacial outwash sands and decomposed granitic parent material. Sand is a major component of the channel and bank substrate. Highly erosive soils are common and occur in both wilderness and non-wilderness reaches (FS 1998). Glacial deposits of sands and gravels make up the principal Methow Valley aquifer. These substrates are so porous and permeable that a high degree of hydraulic continuity is virtually guaranteed as the ground water and surface water exchange rapidly under certain conditions (Peterson and Larson 1991). For example, snow melt in the spring creates high flow levels in the Methow River which caused water levels in wells in the Early Winters area to rise 10 to 25 feet in a one- to two-week period (Golder Associates 1991). Conversely, during drought or low flow years, certain reaches of tributary streams and rivers to the Methow and reaches of the Methow River itself can go dry under natural conditions (without diversions) (EMCON 1993).

Winter anchor ice[3] is another environmental baseline condition that occurs in the Methow River and certain other tributaries. This condition can force juvenile steelhead and spring chinook salmon to seek areas that remain ice-free to survive. Though the extent of damage from anchor ice on fish habitat is unknown, NOAA Fisheries assumes winter freezing conditions contribute to the degraded environmental baseline.

Most of the Chewuch River watershed is located in the Okanogan National Forest. Most of the lower watershed in the lower seven miles of the Chewuch is privately owned. Historically, these lands have been intensively managed, leading to generally degraded steelhead and spring chinook salmon habitat. Land uses and management activities that have degraded habitat in this watershed include water withdrawals, unscreened water diversions, road construction, timber harvest, conversion of land to agriculture or orchards, livestock grazing, recreational development and urbanization (NMFS 1996a, 1996b, 1997, 1998a, 1998b). In this watershed (and throughout the range of both UCR steelhead and UCRS spring chinook ESU's) land management activities have: (1) reduced connectivity (i.e. the flow of energy, organisms, and materials) between streams, riparian areas, floodplain, and uplands; (2) elevated fine sediment yields, filling pools and reducing spawning and rearing habitat; (3) reduced in-stream and riparian large wood that traps sediment, stabilizes streambanks, and helps form pools; (4) reduced or eliminated vegetative canopy that minimizes temperature fluctuations; (5) caused streams to become straighter, wider, and shallower, which has the tendency to reduce spawning and rearing habitat and increase temperature fluctuations; (6) altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; (7) altered floodplain function, water tables and base flows, resulting in riparian wetland and stream

[3]During drought years and winter freezing conditions, certain reaches of the Methow River and some tributaries can ice over from December through February. In addition, Caldwell and Catterson (1992) noted on January 30, 1992 that certain reaches of the Methow River had no surface flow but had one foot of ice covering the riverbed.

dewatering; and (8) degraded water quality by adding heat, nutrients and toxicants (NMFS 1996a, 1996b, 1997, 1998a, 1998b; FEMAT 1993, National Research Council 1996, Spence *et al*. 1996).

Past timber harvest has led to extensive road networks in the watershed. There are over 579 miles of open road and 74 miles of closed road in the Chewuch watershed. About 160 miles of these roads are within 200 feet of streams in the drainage (FS 1998). There are also over 1,000 stream crossings in the watershed (Chewuch Watershed Assessment, FS 1994). Roads parallel both sides of the lower 25 miles of the Chewuch. Valley bottom roads are in place along most of Cub, Boulder, Eightmile, and Falls creeks, and the lower two miles of Lake Creek (FS 1998). Roads in the watershed can affect peak flows through increased drainage in the watershed (Wemple *et al.* 1996). In addition to altered flows, increased sedimentation from road surface erosion can disrupt spawning, migration and other flow-dependent fish behavior. Such disruption can diminish spawner productivity (Spence *et al* 1996).

There are 48 miles of stream accessible to anadromous fish in the watershed, 35 miles of which have roads on each side of the stream. The upper half of the watershed is unroaded in contrast to the more intensely managed lower watershed. Roads, timber harvest, and livestock grazing are common in the lower half of the watershed where soil erosion and sediment delivery rates are naturally high and easily accelerated by management activities (FS 1998).

In addition to the Skyline Ditch, there were two other diversion ditches located on National Forest lands at Eightmile Creek, a tributary to the Chewuch River. Those two ditches together diverted up to 4.5 cfs. The FS has permanently closed those two ditches and is in the process of converting to a well that will withdraw up to 1 cfs. Given the porosity of the underlying geology of the area, this use of this well will likely deplete stream flows by the full amount pumped from it. There are also three water transmission lines (up to 1-inch diameter hose line) located in Brevicomas and Cub creeks, tributaries to the Chewuch River. The water transmission lines collectively use considerably less than 1 cfs. Those diversions and water transmission lines are the subject of other consultations with the FS. The Chewuch River is dammed in two locations outside of the National Forest. Each dam is associated with a water diversion and a fish ladder that provides adult salmon and trout passage (FS 1998). The Chewuch Canal diversion (31 cfs) is located on the Chewuch River at about RM 8.1 and the Fulton Canal diversion (20 cfs) is located at approximately RM 0.9. Together these diversions withdraw an average of 51 cfs (Caldwell and Catterson 1992).

Irrigation withdrawals can vary between years. For instance, irrigation withdrawals were diverting 87.1 cfs from the Chewuch River in 1971 (The Pacific Northwest River Basin Commission [1977] as cited by Caldwell and Catterson 1992). In the summer of 1991, an average of 73 cfs were diverted into the four largest ditches in the Chewuch - the Fulton, Chewuch, Eightmile and Skyline (Caldwell and Catterson 1992). In 1991, the USGS installed a measuring gauge at RM 0.2 that measures flows continuously and from which daily averages are published. This relatively short and incomplete period of record does not cover the full range of

natural variability of climate and water yield, so the lack of comprehensive data limits a full analysis of expected flows.

Flows, as measured at the USGS gauge at RM 0.2, can vary dramatically by season, with the highest flows occurring towards the end of May and early June (up to 4,400 cfs in 1996). Low base flow conditions occur usually occur in September and/or in February and have been measured as low as 52 cfs on September 25, 1995. That measurement included diversions (USGS 1996). The USGS gauge is the only stream gauge providing a continuous record of stream flow in the lower Chewuch Basin. This gauge has been operated since 1991. A gauge on Andrews creek, a small tributary upstream of irrigation diversions, has been in operation since 1969. The period of record at the USGS gauge appears to be generally representative of basin stream flow conditions since 1991. A comparison of flows at the Andrews Creek gauge shows that median daily flows in September and October are equal for the period of record (1969-1998) and (1990-1998). Median flows in July and August are slightly lower for the period of record (1969-1998) as compared to (1990-1998). The period of record available at the USGS gauge is, however, considered representative of a longer period of record encompassing a range of climatic extremes.

Minimum instream flows for the Chewuch River were established by Washington Department of Ecology (WDOE) in December 1976 (Caldwell and Catterson 1992). Although minimum flows were established, those flows only affect water rights established after 1976 (FS 1998). The minimum instream flow set by WDOE for the Chewuch from August 15 through September 15 is 47 cfs (FS 1998), as measured at RM 8.7, upstream of all major water users. The Skyline, Chewuch, and Fulton diversions presently carry up to 68.8 cfs. Periodically, during diversion operations, WDOE administratively established minimum instream flows are not met.

The lack of comprehensive data limits a full analysis of expected flows. The available information shows that during drought or certain late summer-early fall periods when natural (undiverted) stream flows could measure 46 cfs or less, up to 100% of the surface flow could be diverted from the river above its confluence with the Methow River. There have been periods during the late summer-early fall base flow conditions, while diversions are in operation, when lower reaches of the Chewuch River have gone dry. The Chewuch River is on the Clean Water Act 303(d) list as impaired for instream flows.

Based on all the above information, NOAA Fisheries concludes that not all of the biological requirements of listed steelhead and spring chinook salmon for freshwater habitat in general, and for flows in particular, are being met under the environmental baseline in this watershed. Further degradation of these conditions could significantly reduce the likelihood of survival and recovery of these species because of the amount of risk the listed steelhead and spring chinook salmon already face under the baseline conditions.

2.1.2.2.1 Factors Affecting the Species at the Population Scale. In other Opinions, NOAA Fisheries assessed life history, habitat and hydrology, hatchery influence, and population trends in analyzing the effects of the underlying action on affected species at the population scale (see, for example, FCRPS, NMFS 2000). A thumbnail description of each of these factors for each ESU covered under this consultation is provided below.

Upper Columbia River Steelhead

Life History. As in other inland ESUs (the Snake and mid-Columbia River basins), steelhead in the Upper Columbia River ESU remain in freshwater up to a year before spawning. Smolt age is dominated by two-year olds. Based on limited data, steelhead from the Wenatchee and Entiat rivers return to freshwater after one year in salt water, whereas Methow River steelhead are primarily age-2-ocean (Howell *et al*. 1985). Life history characteristics for UCR steelhead are similar to those of other inland steelhead ESUs; however, some of the oldest smolt ages for steelhead, up to seven years, are reported from this ESU. The relationship between anadromous and nonanadromous forms in the geographic area are unclear.

Habitat and Hydrology. The Chief Joseph and Grand Coulee Dam construction caused blockages of substantial habitat, as did that of smaller dams on tributary rivers. Habitat issues for this ESU relate mostly to irrigation diversions and hydroelectric dams, as well as to degraded riparian and instream habitat from urbanization and livestock grazing.

Hatchery Influence. Hatchery fish are widespread and escape to spawn naturally throughout the region. Spawning escapement is dominated by hatchery-produced fish.

Population Trends and Risks. For the UCR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 0.94 to 0.66, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al*. 2000). NOAA Fisheries has also estimated the risk of absolute extinction for the aggregate UCR steelhead population, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness equals zero), the risk of absolute extinction within 100 years is 0.25 (Table B-5 in McClure *et al*. 2000). Assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness equals 100%), the risk of absolute extinction within 100 years is 1.00 (Table B-6 in McClure *et al*. 2000). Because of data limitations, the Quantitative Assessment Reports (QAR) for steelhead in the ESU in Cooney (2000) were limited to two aggregate spawning groups- the Wenatchee/Entiat composite and above-Wells populations. Wild production of steelhead above Wells Dam was assumed to be limited to the Methow system. Assuming a relative effectiveness of hatchery spawners of 1.0, the risk of absolute extinction within 100 years for UCR steelhead is 100%. The QAR also assumed hatchery effectiveness values of 0.25 and 0.75. A hatchery effectiveness on 0.25 resulted in projected risks of extinction of 35% for the Wenatchee/Entiat and 28% for the

Methow populations. At a hatchery effectiveness of 0.75, risks of 100% were projected for both populations.

Upper Columbia River Spring Chinook

Life History. UCRS chinook are considered stream-type fish, with smolts migrating as yearlings. Most stream-type fish mature at four years of age. Few coded-wire tags are recovered in ocean fisheries, suggesting that the fish move quickly out of the north central Pacific and do not migrate along the coast.

Habitat and Hydrology. Salmon in this ESU must pass up to nine Federal and private dams, and Chief Joseph Dam prevents access to historical spawning grounds farther upstream. Degradation of remaining spawning and rearing habitat continues to be a major concern associated with urbanization, irrigation projects, and livestock grazing along riparian corridors. Overall harvest rates are low for this ESU, currently less than 10% (ODFW and WDFW 1995).

Hatchery Influence. Spring-run chinook salmon from the Carson National Fish Hatchery (a large composite, nonnative stock) were introduced into and have been released from local hatcheries (Leavenworth, Entiat, and Winthrop National Fish Hatcheries [NFH]). Little evidence suggests that these hatchery fish stray into wild areas or hybridize with naturally spawning populations. In addition to these NFH, two supplementation hatcheries are operated by the WDFW in this ESU. The Methow Fish Hatchery Complex (operations began in 1992) and the Rock Island Fish Hatchery Complex (operations began in 1989) were both designed to supplement naturally spawning populations on the Methow and Wenatchee rivers, respectively (Chapman *et al.* 1995).

Population Trends and Risks. For the UCRS chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[4] ranges from 0.85 to 0.83, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al*. 2000). NOAA Fisheries has also estimated median population growth rates and the risk of absolute extinction for the three spawning populations identified by Ford *et al*. (1999), using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness equals zero), the risk of absolute extinction within 100 years ranges from 0.97 for the Methow River to 1.00 for the Methow and Entiat rivers (Table B-5 in McClure *et al*. 2000). At the high end, assuming that hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness equals 100%), the risk of extinction within 100 years is 1.00 for all three spawning populations (Table B-6 in McClure *et al*. 2000).

[4]Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period that varies between spawning aggregations. Population trends are projected under the assumption that all conditions will stay the same into the future.

NOAA Fisheries has also used populations risk assessments for UCRS chinook salmon ESU from the draft QAR (Cooney 2000). Risk assessments described in that report were based on Monte Carlo simulations with simple spawner/spawner models that incorporate estimated smolt carrying capacity. Population dynamics were simulated for three separate spawning populations in the UCRS chinook salmon ESU, the Wenatchee, Entiat, and Methow populations. The QAR assessments showed extinction risks for UCRS chinook salmon of 50% for the Methow, 98% for the Wenatchee, and 99% for the Entiat spawning populations. These estimates are based on the assumption that the median return rate for the 1980 brood year to the 1994 brood year series will continue into the future.

2.1.2.2.2 Factors Affecting the Species within the Action Area. Section 4(a)(1) of the ESA and NOAA Fisheries listing regulations (50 CFR 424) set forth procedures for listing species. The Secretary of Commerce must determine, through the regulatory process, if a species is endangered or threatened based upon any one or a combination of the following factors: (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors affecting its continued existence.

The proposed action includes activities that will have some level of effects with short-term impacts from category (1) in the above paragraph, and the potential for long-term impacts as described in categories (4) and (5). The characterization of these effects and a conclusion relating the effects to the continued existence of the listed steelhead and salmon that are the subject of this consultation is provided below, in section 2.1.3.

The major factors affecting UCR steelhead and UCRS chinook within the action area include streamflow conditions, habitat quantity and quality, and unimpeded passage (migration). NOAA Fisheries uses the Matrix of Pathways (MPI) and Indicators to analyze and describe the effects of these factors on listed steelhead and salmon. The MPI relates the biological requirements of listed species to a suite of habitat variables. In the analysis presented here, each factor is considered in terms of its effect on relevant pathways and associated indicators (*properly functioning, at risk, or not properly functioning*).

Streamflow Conditions

Snow melt and glaciers are the primary sources of water in this watershed, and water flows can naturally increase rapidly depending on snowpack volumes and air temperatures during the spring and early summer. Water depth and current velocity are two elements of spawning habitat that relate directly to streamflow. Salmonids typically deposit eggs within a range of depths and velocities that minimize the risk of dessication as water level recedes. These locations ensure the exchange of water between surface and substrate interstices is adequate to maintain high oxygen levels and remove metabolic wastes from the redd (Spence *et al*. 1996). Most species typically spawn at depths greater than 15 cm. Smaller trout will spawn in

shallower waters (Thompson 1972). If diversion ditches are turned on during April and May, and winter base flow conditions persist, redds located in shallower depths could be dewatered.

Streamflow is important in facilitating downstream movement of salmonid smolts. Dorn (1989) found that streamflow increases triggered downstream movement of coho salmon in a western Washington stream. Similarly, Spence (1995) also found short-term flow increases are an important stimulus for smolt migration in four populations of coho salmon. Chinook salmon can gradually move downstream over several weeks or months. Different behaviors entail substantially different habitat requirements during the migration period (Spence *et al*. 1996). Thus, the normal range of streamflows might be required to maintain normal temporal patterns of migration in a particular basin. Streamflow is also important in determining the rate at which smolts move downstream, although factors influencing the speed of migration remain poorly understood (Spence *et al*. 1996).

For salmon and other aquatic organisms, flows determine the amount of available habitat, the types of micro- and macrohabitats, and the seasonal patterns of disturbance to aquatic communities (Spence *et al*. 1996). High-flows redistribute sediments in streams, flushing fine sediments from spawning gravels and allowing recruitment of gravels to downstream reaches. Extreme high flows are essential for developing and maintaining healthy floodplain systems.

Extreme high flows move and deposit sediment, recharge groundwater aquifers, disperse vegetation propagules, and recruit and transport LWD (Spence *et al*. 1996). Low flow conditions can reduce the amount of refugia from predators and elevated water temperatures, reduce the availability of food, and increase competition for space and food sources (Gregory and Bisson 1997).

The number of spawning salmon and trout that can be accommodated in a given stream depends, in part, on the availability of suitable habitats for redd construction, egg deposition, and incubation (Bjornn and Reiser 1991). In general, the amount of habitat suitable for spawning increases with increasing streamflow. However, excessively high flows can cause scouring of the substrate, resulting in injury or death to developing embryos and alevins (Hooper 1973).

Where water is withdrawn from smaller rivers and streams, seasonal or daily flow fluctuations can adversely affect fish, macroinvertebrates in littoral areas, aquatic macrophytes, and periphyton (reviewed in Ploskey 1983). Fluctuating water levels can delay spawning migrations, impact breeding condition, reduce salmon spawning area (Beiningen 1976), dewater redds, expose developing embryos, strand fry (CRFC 1979), and delay downstream migration of smolts. The literature suggests that irrigation diversions contribute to low flows and are likely to inhibit or delay salmonid smolt migration. This delay could limit fish survival and reduce potential numbers of returning adults (NPPC 1986).

Washington Department of Ecology conducted an Instream Flow Incremental Methodology (IFIM) study for the Methow River Basin (Caldwell and Catterson 1992), and included a study site at RM 1.3 on the Chewuch River (within the action area). That study found that the greatest

quantity of habitat occurs at flows of 425 cfs for steelhead spawning, at 275 cfs for spring chinook salmon spawning, at 400 cfs for juvenile steelhead rearing, and at 150 cfs for juvenile spring chinook rearing. The lower Chewuch does not usually meet those flows from August through winter. Water withdrawals divert a substantial percentage of stream during this time period (Caldwell and Catterson 1992).

Peak and base flows are not properly functioning for the lower eight miles of the Chewuch River (FS 1998). The proposed action is consistent with the Peak/Baseflow indicator of the Aquatic Conservation Strategy Objectives of the Northwest Forest Plan for salmonid fish habitat protection (FS 2003). This means that watershed-scale conditions favorable to healthy populations of native salmonids are expected to gradually improve over the existing environmental baseline conditions as irrigation operation and infrastructure improvements are implemented.

Habitat Quantity and Quality

Water withdrawals affect the quality of pools in the lower eight miles of the Chewuch by reducing depth, wetted area, and width. Among juvenile salmonids, these results can result in increased competition for food, reduced dissolved oxygen levels, increased physiological stress, and increased vulnerability to predators. When seasonal low flows occur, deep pools with cool-groundwater upwellings are needed to provide the necessary cover and thermal refugia for juvenile salmonids.

Off-channel habitat in the Chewuch provides important thermal refuge from high summer and cold winter temperatures in the lower 20 miles of the main Chewuch channel. Water diversion contributes to low flow conditions in the lower eight miles of the Chewuch that can cause dewatering of off-channel habitat and reduce the quality and quantity of refugia habitat available for juvenile salmonids. The Chewuch is considered to provide some of the most important refugia habitat for spring chinook salmon in the Methow Basin (FS 1998).

Irrigation withdrawals in the lower Chewuch River, when coupled with seasonal low flow conditions, could also lower groundwater levels. Lowered groundwater levels can reduce riparian habitat within the floodplain, potentially limiting shade, food, detrital sources, and future LWD input. This phenomenon was noted by Caldwell and Catterson (1992) as occurring along the Methow River.

Passage/Migration

Irrigation diversions in the Chewuch subbasin generally begin in mid-April (Skyline start-up is April 1) and end by November 1 of each year. Irrigation start-up usually coincides with steelhead upstream migration into the Methow River (mid-March through May). Steelhead spawning in the upper mainstem and tributaries (Chewuch) occurs from April into July (FS 1998).

Skyline Ditch operates while spring chinook salmon spawn (August-September). The Skyline Ditch historically diminished instream flows, leading to inhibited upstream migration, reduced available spawning and rearing habitat, and contributed to elevated water temperatures above the range optimal for spawning and egg survival (FS 1998).

Adult upstream migration of many salmonid species typically involves rapid movements through shallow areas, followed by periods of rest in deeper pools. Some races, such as spring chinook salmon and summer steelhead, may arrive at spawning sites several months before spawning or hold in mainstem rivers for several weeks or months prior to moving into their natal streams to spawn (Bjornn and Reiser 1991).

All juvenile salmonid species require unobstructed (physically and chemically) access to upstream or downstream reaches for migration or dispersal to feeding grounds. In addition, species and stocks differ in their migratory behavior (timing and speed). Some species may move rapidly to the ocean over a few hours or days, while others (e.g., chinook salmon) may gradually move downstream over several weeks or months (Spence *et al*. 1996). These different behaviors require substantially different habitat attributes during the migration period.

2.1.3 Effects of the Proposed Action

The amendment to the FS special use permit for the operation of the Skyline as proposed is likely to adversely affect UCR steelhead and UCRS chinook. Within the action area, the Chewuch River is a migration corridor for adult and smolt UCR steelhead and UCRS chinook salmon, and provides juvenile rearing, adult holding, and spawning habitat for both species.

NOAA Fisheries' ESA implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline" (50 CFR 402.02).

2.1.3.1 Direct Effects

Direct effects are the immediate effects of the project on the species or its habitat. Direct effects result from the agency action and include the effects if interrelated and interdependent actions. Future Federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated (USFWS and NMFS 1998). For this proposed action, no direct effects upon listed fish result from issuance of the requested amendment to the existing special use permit.

2.1.3.2 Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects might include other Federal actions that have not undergone section 7 consultation but will result from the action under consideration. These

actions must be reasonably certain to occur, or be a logical extension of the proposed action. For this proposed action, the effects on listed fish result from operation of the Skyline Ditch under the amended special use permit, and are therefore indirect effects of issuing the permit.

Particular effects of ditch operation to streamflow, habitat quantity and quality, and passage/migration on each of the two listed species are discussed below.

2.1.3.2.1 Steelhead. The majority of effects of the proposed action on Steelhead are streamflow-based effects on behavioral activities including spawning and incubation, rearing, and fish passage and migration. Irrigation withdrawals affect both the total volume of water available to fish and the seasonal distribution of flow. Changes in the quantity and timing of streamflow alters the velocity of streams which, in turn, affects all types of aquatic biota . The abundance and composition of fish species and assemblages is also regulated by water velocity (Spence *et al*. 1996). In analyzing the effects of the proposed action, NOAA Fisheries must consider how the proposed operation of Skyline will alter the river flow conditions that UCR steelhead would experience if Skyline were not operating.

Spawning and Incubation. According to the weighted usable area curves in Caldwell and Catterson (1992) and the median observed and naturalized hydrographs for the Chewuch (Golder Associates 2002), optimal flow conditions for spawning steelhead are approximately 425 cfs. In average flow years, river flow would drop below 425 cfs about the third week in July and continue to drop until ditch turn-off in mid-October (Caldwell and Catterson 1992; Golder Associates 1993). In the upper Methow Basin watersheds, including the Chewuch, steelhead spawning can continue into July (FS 1998). Embryos develop for a period of one to several months, depending on water temperature and dissolved oxygen availability, before hatching. Incubating eggs or alevins (hatched larval stage fish) would still be in the gravel when flows would naturally begin dropping below optimal conditions for steelhead spawning.

In the Chewuch River, steelhead spawning occurs either prior to the onset of spring snowmelt (late March through mid April), during the ascending and peaking phases of the spring freshet (mid April through early June) or shortly after peak runoff (early June through early July). Most spawning occurs in April and May. In most years for the period of record (Golder Associates 2002), when flows rise to 100 cfs they rise beyond 200 cfs within a few days thereafter. In such years, Skyline's diversion of up to 9 cfs while flows are between 100 cfs and 200 cfs would likely be insignificant in that the total diversion is less than the average daily flow increase. It is possible, however, that in some years flows may hover between 100 cfs and 200 cfs for a few weeks in April and early May. In such years, the diversion of 9 cfs would reduce the amount of available spawning habitat, but it would not be expected to affect incubating embryos.

Given the relative rarity of such flows conditions, and given that the proposed diversion would amount to only four to seven percent of stream flow, it is not likely that this aspect of the proposed Skyline operation would significantly affect steelhead spawning success. Furthermore, diverting up to 17.8 cfs during the rapidly ascending arm of the spring freshet or during and around peak discharge would be expected to be affect spawning success to an even lesser extent.

Late season operations (when flows are between 200 cfs and 80 cfs) are not expected to affect steelhead spawning or incubation because steelhead spawn in the spring.

Rearing. The physical structure of streams and rivers plays a significant role in determining the suitability of aquatic habitat. Habitat structural elements arise from natural geomorphic features, the power of flowing water, sediments budgets, and riparian vegetation which provides bank stability and LWD inputs (Spence *et al*. 1996). Spatial differences and gradients create a variety of macro- and microhabitat attributes that are used by salmonids at various stages of their life histories. Macrohabitat features include pools, glides, and riffles. The relative frequency of these habitat types changes with the size of the stream, the degree of channel constriction, and the presence of LWD (Spence *et al*. 1996). Microhabitat attributes include characteristics such as substrate type, cover, depth, hydraulic complexity, and current velocity (Spence *et al*. 1996).

When instream flow ranges between 200 cfs and 80 cfs at the USGS gauge during peak flow recession, Skyline Ditch will voluntarily operate their diversion at 9 cfs, down from a maximum diversion rate of 17.8 cfs at peak flows. The median observed and naturalized hydrograph for the Chewuch River (Golder Associates 2002) shows that at about 200 cfs (peak flow recession) the effects of diversions on instream flow becomes measurable. This was calculated to occur usually around the first or second week of August in most water years. The effects of diversions on instream flow are then shown to increase until the end of irrigation season (early October). The hydrograph rebounds almost immediately when the ditches are shut off at the end of the irrigation season.

Caldwell and Catterson (1992) concluded the optimal river flow conditions for juvenile steelhead rearing are approximately 400 cfs. In average flow years, the Chewuch would drop below 400 cfs by the end of July. As previously stated, measurable effects of diversions on instream flows are shown on the hydrograph (Golder Associates 2002) to occur at approximately 200 cfs during peak flow recession in most water years. Thus, the effects on steelhead rearing habitat at ditch turn on and during peak flows is likely to be minimal. The weighted useable area curves for juvenile steelhead (Caldwell and Catterson 1992), indicate an inflection point near 100 cfs. In other words, the amount of available rearing habitat declines more rapidly with each incremental reduction below 100 cfs than it declines with each reduction above 100 cfs. The proposed action is intended to protect, to the extent that it is affected by Skyline's operations, a minimum flow of 100 cfs above Fulton Dam.

In most years, flows drop below 100 cfs in late August and remain low until all diversions are shut off in early October (Golder Associates 2002). Operation of the Skyline would contribute to the already naturally declining instream flows, decreasing the quantity of refugia habitat available to juvenile steelhead to avoid predators, reducing the availability of food, and concentrating fish to compete for space and food.

The diversion of up to nine cfs during the peak flow recession range of 200 cfs and 80 cfs (USGS gauge) would equal about nine percent of the flow in the Chewuch River at RM 0.7 (Fulton Canal), but would have little effect to the level to which flows eventually recede. In

seven of 11 years for the period of record, flows have eventually dropped below 80 cfs (at the USGS gauge, 100 cfs above Fulton Dam) during the irrigation season. In all years, flows dropped below 100 cfs by the end of September. The effect of Skyline operations during peak flow recession operations then, is to reduce river flows to 80 cfs sooner than they might otherwise, and to reduce flows to less than 100 cfs more often. As stated previously, when flows are 80 cfs at the USGS gauge, they are 100 cfs above Fulton Dam. A flow of 100 cfs above the dam provides approximately 50 percent of potential steelhead rearing habitat (as compared to optimal flow conditions).

According to the data presented in Golder Associates (2002), if Skyline diverts 9 cfs, flows in the Chewuch on average will decline to 80 cfs at the USGS gauge two to three days earlier than if Skyline were not diverting. This aspect of Skyline's operations will reduce the amount of steelhead rearing and macroinvertebrate habitat, but these effects would be expected to be insignificant and immeasurable.

When instream flow in the Chewuch drops below 80 cfs at the USGS gauge, Skyline can continue to divert up to 4.5 cfs, but only if the full amount of their diversion is made up by reductions in diversions by other water users at or above RM 8. As mentioned previously, the FS's conversion from a surface diversion from Eightmile Creek to a well at will replace 2 cfs of Skyline's diversion when flows are at or below 80 cfs. It is not clear at present from where the other reductions will come. If other replacement water is not secured, Skyline's diversion will be limited to the 2 cfs already provided by the FS. Accordingly, Skyline operation at flows below 80 cfs are not likely to significantly affect steelhead rearing conditions.

Passage/Migration. Steelhead spawn in the Methow River basin and its tributaries from March through July. Returning fish may hold or stage in the Methow River or the lower Chewuch (mid-February through May) awaiting adequate instream flows prior to returning to their natal grounds to spawn. Minimum depth for adult steelhead passage is about 18 cm (seven inches) (Thompson 1972, Bjornn and Reiser 1991). According to the BA, 100 cfs provides depths greater than 1 foot at all riffles.

The proposal to maintain at least 100 cfs instream flow at the USGS flow gauge at RM 0.2 when ditch start-up occurs would coincide with natural spring snow melt conditions found in the Chewuch Basin in most water years. Instream flow would be expected to rise quickly as snow melt occurs, minimizing the effects of operating the diversion on passage flows. Likewise, the effects to steelhead of ramping up diversion flows to a maximum of 17.8 cfs during peak flow conditions would likely be minimal, and unmeasurable. Golder Associates' (2002) comparison of the median observed and naturalized hydrograph for the Chewuch River for water years 1992-2001 graphically demonstrated this relationship. Furthermore, should instream flow drop below the identified "trigger" points (100 and 200 cfs) at ditch start-up, Skyline Ditch Company would not be authorized to operate (less than100 cfs), or operate at a reduced diversion rate (less than 200 cfs). The diversion start-up and ramping up of diversion flows would coincide with the natural ascending hydrograph. Therefore, Skyline operations are not expected to adversely affect adult migration.

Migrating juvenile fish are particularly vulnerable to predation. The lower reach of the Chewuch watershed has been modified by land management actions that have removed habitat complexity (riparian vegetation and LWD) needed for juvenile salmonids (FS 1998). Low baseflow conditions exacerbated by water diversions in the action area could increase competition among juvenile steelhead for shelter/cover, food, and space. However, the proposed Skyline operation at ditch start-up is anticipated to be protective of migrating juvenile steelhead because of the small rate of diversion relative to stream flow and because flows are expected to rise rapidly after reaching 100 cfs. Smolt migration would be expected to be naturally delayed in years when flows hover between 100 cfs and 200 cfs. Skyline's diversion would not be expected to further delay migration in those years.

2.1.3.2.2 Spring Chinook Salmon. The majority of effects of the proposed action on spring chinook are streamflow-based effects on behavioral activities including spawning and incubation, rearing, and fish passage and migration. The effects of low flows on steelhead described above are similar to those effects on chinook salmon. According to the weighted usable area curves (Caldwell and Catterson 1992), optimal flow conditions for spawning chinook are approximately 275 cfs. In average flow years, river flow would drop below 275 cfs during peak flow recession about the first week of August and continue to drop until ditch turn-off in October (Golder Associates 2002). According to observations in 1987, spring chinook spawned in the lower Chewuch (action area) reaches from August 18 to September 8 (Caldwell and Catterson 1992).

Spawning and Incubation. Stream conditions during incubation can have a dramatic effect on the survival of incubating eggs. Experiments by Gangmark and Broad (1955) and Gangmark and Bakkala (1960) in Mill Creek, California, demonstrated that aside from large floods, chinook egg fatality was associated with low oxygen in the spawning gravel (less than 5 ppm) and poor percolation of water through spawning gravel (Groot and Margolis 1991). Adequate water percolation through the spawning gravels is essential for egg and alevin survival. Becker *et al.* (1982, 1983) investigated the effects of dewatering artificial chinook redds on survival and development rate of embryos at various stages of development. Alevins were most sensitive to both periodic short-term dewatering and a prolonged single dewatering, surviving at less than four percent in periodic dewaterings of one hour or a single dewatering of six hours (Groot and Margolis 1991). The development rate of embryos was also reduced in those instances in which survival was affected but not in instances when survival was good (Groot and Margolis 1991).

The proposed diversion of 9 cfs when instream flow in the Chewuch drops between 200 cfs and 80 cfs at the USGS gauge will likely affect spawning chinook and their redds by reducing the quantity of potential spawning habitat. However, as discussed in section 2.1.3.2.1, the data presented in Golder Associates (2002) indicates that if Skyline diverts 9 cfs, flows in the Chewuch on average will decline to 80 cfs at the USGS gauge two to three days earlier than if Skyline were not diverting. This aspect of Skyline's operations will reduce the amount of spring chinook spawning habitat, but not likely to the point where spawning habitat quality or spawning success would be threatened.

In some years, Chewuch River flows will drop below 80 cfs while spring chinook spawn. As Skyline's diversion of up to 4.5 cfs must be fully replaced, the proposed action will not affect spring chinook spawning or incubation when flows are below 80 cfs.

Rearing. Caldwell and Catterson (1992) concluded the optimal river flow conditions for juvenile chinook rearing are approximately 150 cfs. In most years, the Chewuch would drop below 150 cfs at peak flow recession about the second week of August (no diversions). With diversions (Skyline, Chewuch, and Fulton), flow would drop below 150 cfs about 5 days earlier. Both natural (no diversions) and observed (with diversions) flows would continue to drop until the ditches are shut off.

According to the IFIM study, near optimal rearing habitat conditions for juvenile spring chinook range from approximately 150 cfs to approximately 80 cfs instream flow. The weighted useable area curves for juvenile chinook (Caldwell and Catterson 1992), indicate a significant inflection point near 80 cfs. In other words, the amount of available rearing habitat declines far more rapidly with each incremental reduction below 80 cfs than it declines with each reduction above 80 cfs. According to Golder Associates (2002), in most years the river drops to 80 cfs about the first week of September (with diversions). The effects of operating the diversion at 9 cfs to juvenile spring chinook between peak flow recession flows ranging from 200 cfs to 80 cfs (USGS gauge) will likely be minimal because near optimal flow conditions for rearing will be present at that time (IFIM Caldwell and Catterson 1992).

As they emerge from the gravel, chinook fry and early juvenile life history stages tend to seek out shallow water, low energy habitats near channel margins. These life stages have fairly modest space requirements, but are vulnerable to stranding if flows fluctuate. Delaying Skyline start-up until flows reach 100 cfs and limiting withdrawals to 9 cfs when flows range between 100 cfs and 200 cfs should sufficiently avoid stranding or other adverse affects to rearing juvenile chinook salmon at ditch start-up and through the peak flow operating period.
Passage/Migration. Streamflow during upstream migration must enable passage over physical barriers including falls, cascades, and debris jams. Accordingly, migrations of many stocks coincide with high flows (Spence *et al*. 1996). Spring and summer chinook adults migrate during periods of high flows that allow them to reach spawning tributaries in headwaters reaches, while fall-run stocks, which typically spawn in lower reaches, can enter streams during periods of relatively low flow (Healey 1991).

Minimum passage for large chinook salmon is 24 cm (9.4 inches) (Thompson 1972, Bjornn and Reiser 1991). As for steelhead, large passage barriers require substantially deeper pools (Stuart 1962). Pool configuration influences passability. Less severe inclines can be more difficult to pass if pool depths are inadequate and flow velocities are high (Stuart 1962). Low instream flow conditions in the Chewuch river can hinder or delay adult spring chinook salmon from entering the river to spawn from late July to September, when irrigation diversions further decrease low flows. According to the BA, 80 cfs at the USGS gage translates to more than 9.4 inches of water depth throughout the action area.

Streamflow-caused barriers to adult migration (July-September) should not occur under the proposed flow plan in most flow years. When instream flow ranges between 200 cfs and 80 cfs at the USGS gauge during peak flow recession, Skyline Ditch will operate their diversion at 9 cfs, down from a maximum diversion of 17.8 cfs at peak flows. The median observed and naturalized hydrograph for the Chewuch River (Golder Associates 2002) shows that at about 200 cfs (peak flow recession) the effects of diversions on instream flow becomes measurable. This was calculated to occur around the first or second week in August in most water years. Chinook will already be in the Chewuch at that time. Operating the diversion under the proposed flow plan in low streamflow water years could hinder or delay passage of spring chinook to upstream spawning tributaries. However, data presented by the FS (2003) suggest that the minimum depths necessary for adult chinook migration are present in the Chewuch at flows of 80 cfs.

Migrating juvenile chinook are particularly vulnerable to predation. These fish move in concentration through areas with limited cover and many predators. Past environmental changes from land use activities in the lower Chewuch watershed decreased habitat complexity (riparian vegetation and LWD) needed for juvenile salmonids (FS 1998). Low baseflow conditions exacerbated by water diversions in the action area would increase competition among juvenile spring chinook salmon for shelter, cover, food, and space.

The proposed Skyline operation at ditch start-up would be protective of migrating juvenile spring chinook because of the small rate of diversion relative to stream flow and because flows are expected to rise rapidly after reaching 100 cfs. Smolt migration would be expected to be naturally delayed in years when flows hover between 100 cfs and 200 cfs. Skyline's diversion would not be expected to further delay migration in those years.

2.1.3.2.3 Additional Minimization. The FS proposes to maintain flow year round in the Skyline Ditch fish bypass channel. The channel is approximately one half mile in length, and contains off channel rearing habitat for juvenile salmonids. The channel provides refugia habitat for rearing salmonids at all river flows, and does not freeze up during the winter. This habitat feature is important because there are few off-channel rearing areas available to juvenile salmonids in that reach of the Chewuch.

2.1.3.2.4 Groundwater Recharge. Because of the hydrologic continuity of surface and groundwater in the basin, some believe that a large portion of the water diverted for agricultural or other domestic purposes returns near the point of diversion later in the year, improving conditions for riparian vegetation and fish. As a result, returning water is available for other uses (*i.e.*, riparian vegetation watering, fish use, etc.) within the basin (Mullan *et al.* 1992). NOAA Fisheries is unaware of any empirical support for this notion and generally believes that diverting flow from streams and rivers contributes to degraded environmental baseline conditions for listed anadromous fish within stream segments that could be used by fish if conditions were suitable.

The IFIM report (Caldwell and Catterson 1992) suggests that aquifers are complex and not well understood for the Methow Valley. According to Mullan *et al.* (1992), "available geologic data are inadequate for delineating formations and aquifers that have relatively good or poor water-yielding characteristics in the Methow Valley." Nassar (1973) reported that the actual contribution of return water depends not only on the storage characteristics of the aquifer, but also on the local hydraulic gradient and the degree of transmissivity between the stream and the groundwater. In areas where return flow are suspected (*e.g.*, Early Winters Creek, Chewuch River, and the Wolf Creek subbasin) the flows often do not reach the main channel for many miles downstream. The delay in returning flows results in dewatering of stream and tributary habitats (EMCON 1993).

The IFIM report also discusses the effects when ditches are turned off in the fall and water levels in the river do not immediately return to full flows (Caldwell and Catterson 1992). For example, six days after the Chewuch irrigation ditches stopped diverting 64.2 cfs in early October 1991, the flow in the Methow River had increased only 1 cfs compared to flows during diversions (from 228 to 229 cfs). Other observed effects were a recovery of only 39% of pre-diversion river flows near Twisp two days after the irrigations were turned off. The authors of the IFIM report speculate that the missing water was still bound in groundwater along riparian areas, where the demand for bank storage would not be met for some period of time (Caldwell and Catterson 1992).

The flow observations between the Skyline/Chewuch diversions during 2001 and 2002 indicate that decreases in flow can be observed immediately downstream of the irrigation diversions that are approximately equivalent to the diversion rates. However, there is significant return flow and/or groundwater upwelling occurring between Cub Creek and Pete Creek. Much of this return flow may be the result of irrigation from Skyline users, since the amount of flow increase dropped dramatically after the ditch was shut down, and flow observations in November, when ditches have been off, do not show unexplained gains or losses. Flow gains of over 20 cfs were observed prior to shut down and only 9 cfs of flow gain was observed after shut down. A portion of this observed gain may be explained by operational practices (release of flow at Cub Creek by Skyline). This factor would explain a portion of flows observed during part of the irrigation season but cannot account for the entire difference (FS 2003).

The response of the USGS gauge on the Chewuch measures the combined effect of diversions, return flows, and groundwater inflow/outflow. The monitoring conducted during 2001 and 2002 season clearly indicates that the relationship between flow at the USGS gauge and the flow at any specific location along the lower 8 miles of the Chewuch River is not straightforward. However, there is clear evidence that much of the water diverted above the Fulton diversion by Skyline and Chewuch ditches is returned to the river via groundwater recharge, and that there is also natural groundwater upwelling. This appears to occur high in the system (*i.e.*, above Cub Creek), and serves to offset the impacts from diversions (FS 2003).

The best available information considered for this consultation suggests that operating surface water diversions during low baseflow conditions contribute to a seasonal reduction in the volume

of water stored in the riparian groundwater bank. A seasonal reduction in riparian groundwater storage exacerbated by water withdrawals, which coincides with the growing season, could potentially inhibit or prevent riparian vegetation from establishing or obtaining future proper functioning condition because water might not be available to the root zone during the growing season. Thus, the diminished health and lower density of plants, shrubs, or trees (riparian community) that provide bank stabilization, shade, organic debris, food sources (insects), and future LWD in the action area can have significant long-term adverse effects to habitat for both steelhead and spring chinook salmon. The adverse effects on listed fish of diverting water from streams during the irrigation season likely outweigh any benefits of later groundwater recharge by previously withdrawn water.

2.1.3.3 Population Scale Effects

As detailed in section 2.1.2.2, NOAA Fisheries has estimated the median population growth rate (lambda) for each species affected by operating the Skyline Ditch. Under the environmental baseline, life history diversity has been limited by the influence of hatchery fish, by physical barriers that prevent migration to historical spawning/or rearing areas, and by habitat loss, modification, or degradation caused by reductions in streamflow. In addition, hydropower development has profoundly altered the riverine environment and those habitats vital to the survival and recovery of the ESUs that are the subject of this consultation.

Amending the FS special use permit to the Skyline Ditch Company is expected to add temporary (seasonal), operational-related effects to the existing environmental baseline by reducing the amount or quality of habitat available for spawning, egg incubation, refugia from predators, availability of food, increased competition for space and food sources, and impaired migration habitat. The same kinds of adverse effects are likely to occur to both the steelhead and chinook, although the specific levels of impacts to each species would vary by life stage and time of year. Further, NOAA Fisheries believes that long-term, minor effects to riparian habitat (vegetation health and density) could occur by streamflow diversion. However, these effects, as detailed above, are not expected to have any significance at the population level. Therefore, NOAA Fisheries believes that the proposed action does not contain measures that are likely to influence population trends of the affected ESU.

2.1.3.4 Cumulative Effects

Cumulative effects are defined as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR 402.02). Future Federal actions that are unrelated to the proposed actions are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Generally, local conservation efforts and habitat restoration projects will continue to improve conservation and restoration of spring chinook salmon and steelhead habitat on non-Federal land in the region of the proposed action. Furthermore, improvements such as infrastructure upgrades

planned for other water diversions in the Chewuch and Methow basins will probably reduce the contribution of those diversions to future habitat degradation.

Other non-Federal diversions in the Chewuch River contribute to cumulative adverse effect on instream flows for fish. For example, the two other sizable diversions are Chewuch Canal (31 cfs) and Fulton Canal (20 cfs) located downstream of the Skyline Ditch at RM 8.0 and RM 0.7, respectively. Because these diversions do not constitute a Federal action, no ESA consultation will be done and withdrawals are expected to continue at similar levels into the immediate future. However, the above mentioned entities along with the Skyline Ditch Company, have formed the Chewuch Basin Council to cooperatively seek efficiency improvements to their water delivery systems and to seek flow plan and habitat improvements to maintain adequate instream flows.

Existing studies report that conversion of water use from irrigation to domestic use is related to real estate development in the Methow Basin (Peterson and Jackson, 1990, EMCON, 1993, and Methow Valley Planning Committee, 1994). Continuing real estate development (especially for residential use) is expected to continue into the foreseeable future. The precise effects of expected development on in-stream flows during low flow periods, late summer/early fall and winter, have not been documented. However, estimates from these reports show that if only six percent of the saved water from total irrigable acres in the basin (12,900 acres) is converted to domestic use, an additional 950 homes could be built in the basin, which could support approximately 2,800 people. The basin's current population is only about 4,500. Using water saved from irrigation to support development in the face of an expanding population in the basin will maintain at risk and not properly functioning habitat indicators in the area of the proposed action.

One measure of potential cumulative impacts is the number and magnitude of applications for water rights within the action area on the Chewuch River. As of 2000, there were 25 applications to Washington Department of Ecology for ground-water wells, totaling 6.7 cfs (3,005.3 gpm), and one application to withdraw 0.0002 cfs (0.11 gpm) of surface water. The trend toward groundwater claims is expected to continue. Increasing demand on groundwater would contribute to maintaining at risk and not properly functioning habitat indicators in the area of the proposed action.

For purposes of this description of cumulative effects, NOAA Fisheries assumes that future non-Federal activities in the area of the proposed action will continue into the immediate future at present or increased intensities. Accordingly, these actions will contribute to maintenance of at risk and not properly functioning habitat indicators.

2.1.4 Conclusion/Opinion

NOAA Fisheries has reviewed the direct, indirect, and cumulative effects of the proposed action on the above listed species and their habitat. NOAA Fisheries evaluated these effects in light of existing conditions in the action area and measures included in the action to minimize the effects.

The proposed action is likely to cause long-term adverse effects to listed salmonids seasonally decreasing the amount of habitat available for them and their food items. These effects are not expected to appreciably reduce salmonid distribution, reproduction, or numbers. Consequently, the proposed action is not likely to jeopardize the continued existence of listed UCRS chinook and/or UCR steelhead.

2.1.5 Reinitiation of Consultation

This concludes formal consultation for issuance of a special use permit to operate the Skyline Ditch. Consultation must be reinitiated if: (1) the amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes and effect on listed species that was not previously considered; or (4) a new species is listed (50 CFR 402.16). To reinitiate consultation, the FS should contact the Habitat Conservation Division (Washington Branch Office) of NOAA Fisheries. Upon reinitiation, the protection provided by this incidental take statement, section 7(o)(2), becomes invalid.

2.2 Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined as significant habitat modification or degradation that results in death or injury to listed species by "significantly impairing behavioral patterns such as breeding, spawning, rearing, migrating, feeding, and sheltering" (50 CFR 222.102). Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the effects of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize take and sets forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.2.1 Amount or Extent of Take Anticipated

As stated in section 2.1.1, above, UCR steelhead and UCRS spring chinook salmon use the action area for migration, rearing, and spawning habitat. Both steelhead and spring chinook salmon are likely to be present in the action area any day of the year. Therefore, incidental take of these listed fish is reasonably certain to occur. The proposed action includes measures to reduce the likelihood and amount of incidental take. To ensure the action agency carries out

these measures, take minimization measures included as part of the proposed action are restated in the Terms and Conditions provided below.

Take caused by the proposed action is likely in the form of harm, where habitat modification will impair normal behavior patterns of listed salmonids. Harm is likely to result from the decreasing quantity of refugia habitat available to juvenile steelhead and spring chinook salmon to avoid predators, reducing the availability of food, and concentrating fish to compete for space and food when in-stream flows are approaching low late summer-early fall base flow conditions. Harm may also result when low in-stream flow conditions in the Chewuch River may hinder or delay adult spring chinook salmon from entering the river to spawn from late July to September, when irrigation diversions exacerbate low flows. The amount or extent of take from these causes is difficult, if not impossible to estimate. In instances where the number of individual animals to be taken cannot be reasonably estimated, NOAA Fisheries uses a surrogate approach. The surrogate should provide an obvious threshold of authorized take which, if exceeded, provides a basis for reinitiating consultation.

This Opinion analyzes the extent of effects that would result from streamflow diversion, particularly during the peak flow recession period of each water year. Despite the use of the best scientific and commercial data available, NOAA Fisheries cannot estimate the number of fish that would be injured or killed by these occurrences. Therefore, the extent of take anticipated in this statement is that which would occur from operating the Skyline Ditch as proposed. Should any of the Skyline not be operated in this manner, the reinitiation provisions of this Opinion apply.

2.2.2 Reasonable and Prudent Measures

The measures described below are non-discretionary. They must be implemented so that they become binding conditions in order for the exemption in section 7(a)(2) to apply. The FS has the continuing duty to regulate the activities covered in this incidental take statement. If the FS fails to adhere to the terms and conditions of the incidental take statement through enforceable terms added to the document authorizing this action, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

NOAA Fisheries believes that the following reasonable and prudent measures, along with conservation measures described by the FS, are necessary and appropriate to minimize the take of ESA-listed fish resulting from implementation of this Opinion.

1. The FS will minimize take from the operation of diversion infrastructure.

2. The FS will minimize take from decreased instream flows.

2.2.3 Terms and Conditions

To comply with ESA section 7 and be exempt from the prohibitions of section 9 of the ESA, the FS must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These Terms and Conditions largely reflect measures described as part of the proposed action in the BA and the foregoing Opinion. NOAA Fisheries has included them here to ensure that the action agency is well aware that they are non-discretionary.

1. To implement Reasonable and Prudent Measure No.1:

    1.1 The FS will inspect the headgate and fish screen at the completion of any structural modifications to ascertain whether required construction standards have been met. The FS will require the permittee to inspect the headgate to ensure proper operation prior to commencing operations each irrigation season.

2. To implement Reasonable and Prudent Measure No. 2:

    2.1 The FS will require that the permittee modify (ramp) its diversion operations at the threshold streamflows, as measured at RM 0.2, identified in the project description. This means the permittee will cease or delay diversion if the threshold streamflow level for a particular period cannot be maintained.

    2.2 The FS will require the maintenance of continuous flow monitoring devices located (1) at the upstream point of diversion within the Skyline Ditch, *i.e.*, the Cipolleti weir or similar measuring device, and (2) in the Chewuch River immediately downstream of the Skyline Ditch diversion. The permittee will provide data from these devices to the FS or its designee upon request.

2.2.4 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat. The following are discretionary suggested actions that the FS can implement in furtherance of its responsibilities under section 7(a)(1) of the ESA.

1. The FS should recommend that prior to operating the Skyline Ditch each season, the permittee inspect and repair as necessary all elements of the water conveyance system.

2. The FS should recommend that the permittee continue to work with the Chewuch Basin Council to complete a habitat conservation plan to address long-term management of instream flows that will promote recovery of listed fish species in the Chewuch River watershed.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2));

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affect EFH (section 305(b)(4)(A));

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (section 305(b)(4)(B)).

Essential Fish Habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA section 3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

An EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of Essential Fish Habitat

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: chinook; coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed action and action area are detailed above in section 1.2 and 1.3 of this document. The action area includes habitats that have been designated as EFH for various life-history stages of chinook and coho salmon.

3.4 Effects of Proposed Action

As described in detail in section 2.1.3 of this document, the proposed action may result in short- and long-term adverse effects to a variety of habitat parameters.

1. Seasonal reduction of streamflow that reduces the quantity and quality of spawning, incubation, juvenile rearing, and migration habitat for salmonids.

2. Long-term diminishment of health and density of riparian vegetation in the action area.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action would adversely affect EFH for chinook and coho salmon.

3.6 Essential Fish Habitat Conservation Recommendations

Pursuant to section 505(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the FS, it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. To minimize the adverse effects to designated EFH for Pacific salmon (reduced streamflow and diminished riparian health), NOAA Fisheries recommends that the FS implement Terms and Conditions No. 1 and 2 as described in section 2.2.3 of this document.

3.7 Statutory Response Requirement

Pursuant to the MSA (section 305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The FS must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(k)).

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